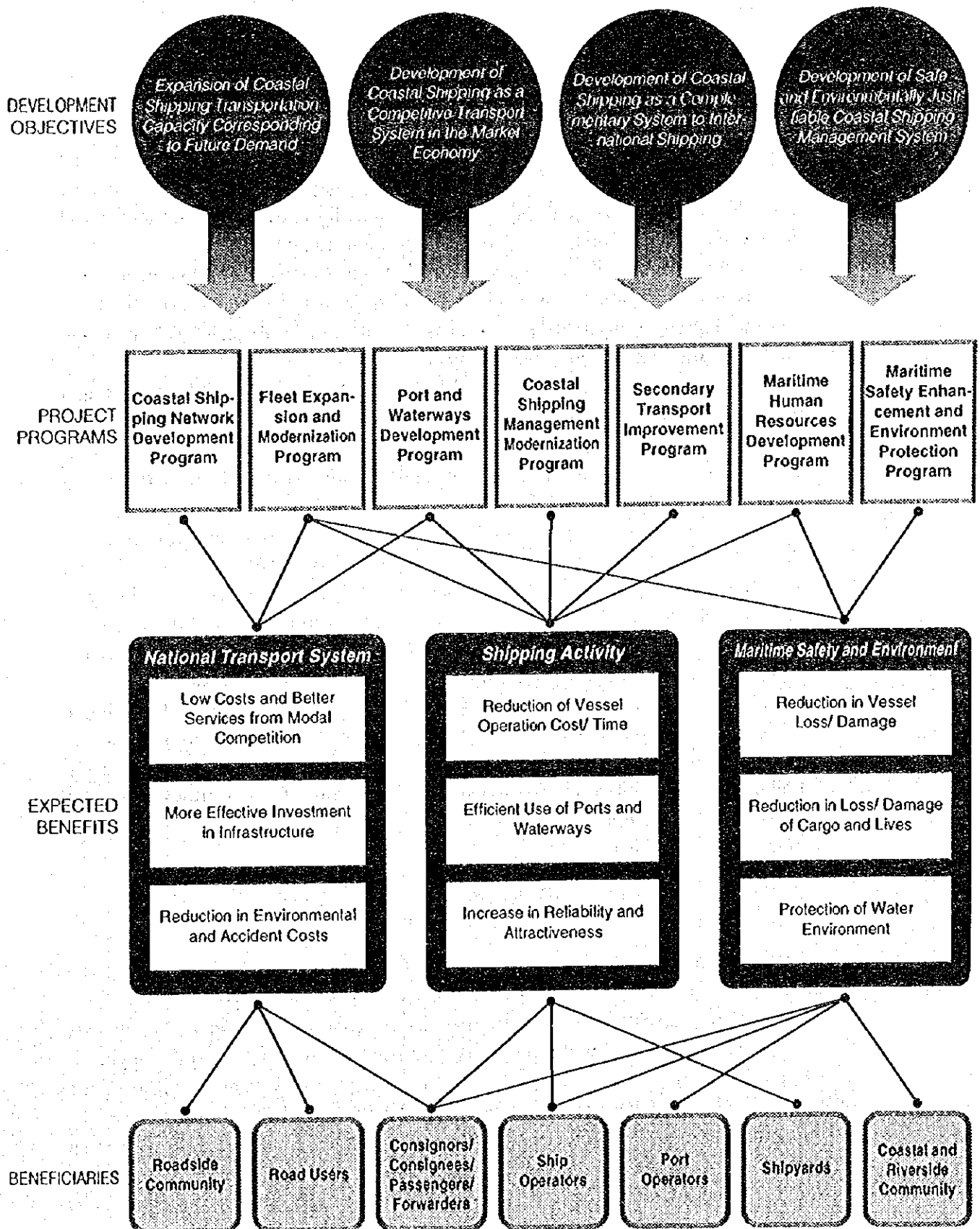


**Figure 6.4.1
EXPECTED BENEFITS AND BENEFICIARIES OF MASTER PLAN**



It should be noted that many aspects of the Master Plan would produce benefits for the international shipping and inland waterway sub-sectors, because of the considerable overlap between the activities of coastal shipping and these other sub-sectors (especially from port and waterway development).

Particular features of Figure 6.4.1 worth noting include the following.

(1) The core of the benefits are likely to arise from Fleet Expansion and Modernisation, and from Ports and Waterways Development. These fundamental measures reduce operating costs and increase level of service, and thereby attracting additional coastal shipping traffic. In addition the use of modern vessel designs potentially reduces accident and environmental costs.

(2) The Vietnamese oil industry would probably be the greatest single beneficiary of coastal shipping improvements because of the large use it is forecast to make of coastal shipping (about 50% of total traffic in both 2000 and 2010 assuming implementation of the Dung Quat project).

(3) Measures proposed under Coastal Shipping Management Modernisation and the Maritime Human Resources Development Programme strongly reinforce the above-mentioned fundamental measures, by improving management and staff capacity to achieve the potential benefits (both cost/level of service and accident/environmental benefits).

(4) The measures proposed under the Secondary Transport Improvement Programme are important for customers using feeder/distributor services at coastal shipping ports, especially the users of inland waterway services who are likely to receive significant benefits from the many proposed inland waterway improvements. For most other users using essentially port-to-port services the benefits from secondary transport improvements will be much smaller.

(5) The Maritime Safety Enhancement and Environmental Protection Programme is probably the component of the Master Plan which most benefits the riverside and coastal communities who, though non users of shipping services, are at risk from pollution caused by shipping accidents and pollution. However this component also benefits the users, by reducing the cost of accidents. This aspect is considered in more detail in Section 6.4.3.

(c) Comparison of Transport Costs

In order to assess the importance of coastal shipping to the Vietnamese economy as a whole, the future national transport expenditure for two scenarios has been compared. Both infrastructure investments and operating cost expenditure are estimated to indicate the trade-offs between the two. Both these scenarios assume that coastal shipping is developed to serve the Dung Quat project, both for supply of crude and for distribution of refined products. (There is uncertainty about how and when this project will be implemented and much of the investment resources required for oil traffic, such as that required for specialised oil berths, is not included in the proposed Master Plan expenditure. The additional coastal shipping expenditure required by the Dung Quat

project is therefore assumed to be the same under both scenarios, and excluded from the comparisons.) The scenarios are defined as follows.

Scenario 1 - implement the Master Plan to increase investment and make improvements to increase the role of coastal shipping as forecast in the Master Plan.

Scenario 2 - continue as at present with minimum investment and improvement in coastal shipping so that the current role of coastal shipping is maintained at its current level.

The traffic assumed to be carried in 2010 by coastal shipping and inland modes for each scenario is shown in Table 6.4.3. Traffic under Scenario 1 is assumed to be as given in the Master Plan forecasts. Under these forecasts non oil traffic increases from 3.0 to 16.0 billion ton km between 1995 and 2010, while oil traffic increases from 0.5 to 13.0 million ton km. The proportion of non-oil inland traffic carried by coastal shipping increases from about 32% to 44%. Under Scenario 2 it is assumed that the lack of improvements to coastal shipping results in this proportion remaining the same at 32%, limiting the 2010 non oil traffic level to 11.7 million ton km. No change is assumed in the oil forecast for Scenario 2 (which depends almost entirely on how the Dung Quat project is implemented rather than on how the Master Plan recommendations are implemented). Also no change is assumed in passenger forecasts which depend mainly on development plans for tourism and for the islands, rather than on how the Master Plan recommendations are implemented.

The capital expenditure for Scenario 1 is based on the estimates made in developing the Master Plan and includes the costs of specialised non-oil ports and passenger terminals. Costs of specialised oil ports are not included because these are the same for all scenarios. It includes the costs of sea-cum-riverway upgrading along sea-cum-riverways mainly used by domestic shipping, and of providing visual ATN, SAR and sea communications (which are shared between inland water transport, coastal shipping, international shipping and fishing activities). Costs of training and other support activities recommended under the Master Plan are also included, even though these too are shared with international shipping. The vessel acquisition cost assumes the recommended fleet acquisition programme of Alternative 3 is adopted, with no vessel chartering or reassignment from international routes. The costs of oil tankers are excluded because these are the same for all scenarios. The costs of equipping ship yards to build and repair coastal shipping vessels within Vietnam are also included.

Table 6.4.3
SUMMARY OF COASTAL SHIPPING CARGO TRAFFIC FORECASTS

	1995	2000	2010
WITH MASTER PLAN (Scenario 1)			
Total Inland Freight (million tons)	77.3	85.5 - 94.1 ⁽¹⁾	253 - 353 ⁽¹⁾
of which: road, rail, water	74.6 ⁽²⁾	71.3 - 79.7 ⁽¹⁾	221 - 318 ⁽¹⁾
coastal shipping	2.7	14.4	34.3
Total Inland Freight (billion ton km)	9.8	18.9	49.5
of which: road, rail, water	6.3 ⁽²⁾	6.4 ⁽³⁾	20.5 ⁽³⁾
coastal shipping	3.5	12.5	29.0
of which: oil	0.5	6.5	13.0
non-oil	3.0	6.0	16.0
Total Inland (except coastal oil)	9.3	12.4	36.5
Coastal Shipping (% of inland, excl. oil)	32	48	44
WITHOUT MASTER PLAN (Scenario 2)			
Total Inland Freight (billion ton km)	9.8	18.9	49.5
of which: road, rail, water	6.3 ⁽²⁾	8.4	24.8
coastal shipping	3.5	10.5 ⁽⁴⁾	24.7 ⁽⁴⁾
of which: oil	0.5	6.5	13.0
non-oil	3.0	4.0	11.7
Total Inland (except coastal oil)	9.3	12.4	36.5
Coastal Shipping (% of inland, excl. oil)	32	32	32

NOTE (1) JICA Study revised MOT forecasts.

(2) Based on 1994 GSO data for road, railway and water, assuming 5% growth.

(3) Assuming reduction in length of haul of 10% by 2010 due to transfer of traffic to coastal shipping.

(4) Assuming constant proportion of total non-oil traffic but increasing oil traffic)

SOURCE: JICA Study estimates

Annual expenditure on coastal shipping transport is based on the charges, described in Table 4.2.15 in Section 4.2, for medium and long hauls (about VND 200 per ton km including loading/unloading and feeder/distribution on secondary transport services), but assuming that in 2010 these would be 25% less due to efficiency improvements expected under the Master Plan proposals. This cost reduction has been estimated from the assumed increase in average non-oil cargo ship size from 1,000 to 1,500 DWT by 2010 (see Table 6.3.6 for Alternatives 3 and 1 respectively), which should reduce transport costs by 25% as shown in Appendix 7 of the Maritime Transport Industry Supplementary Report (where the average economic cost per tonne km is estimated to reduce from VND 114.3 to 86.1). A similar change is assumed for passenger vessels. There is a possibility of double counting vessel acquisition and infrastructure costs due to the inclusion in these charges of depreciation allowances and port/waterway user charges. However the extent of this should be small because insufficient allowance is currently made by shipping operators for depreciation, and user charges for coastal shipping are currently cross subsidised by international shipping (especially foreign-owned operators).

Annual expenditure on passenger transport has been roughly estimated from current fares (about VND 300 per passenger km for interprovincial/inter island services and VND 3,000 per passenger km for tourist services and assuming 30 km average trip length). Based on the forecast demand this would give average expenditure per passenger in 2010 as US \$ 5.7, as shown in Table 6.4.4. However due to efficiency improvements it is assumed that a 25% reduction in expenditure occurs under Scenario 1.

Table 6.4.4
EXPECTED EXPENDITURE ON PASSENGER SERVICES (WITHOUT EFFICIENCY IMPROVEMENTS)

Year	2000		2010	
	Number of Passengers (thousands)	Expenditure (US \$ million)	Number of Passengers (thousands)	Expenditure (US \$ million)
Interprovincial	644	0.53	1,059	0.87
Inter Island	114	0.09	139	0.11
Tourist	992	8.12	2,392	19.57
TOTAL	1,750	8.74	3,590	20.55

SOURCE: JICA Study Team

Capital expenditure for Scenario 2 is based on that for Scenario 1, with modifications to allow for the lack of investment and improvement in coastal shipping. Under this scenario, coastal shipping cargo traffic is 27% less (being distributed in a ratio of 80:20 between road and rail), and so investment in ports for coastal shipping is assumed to be correspondingly less (by 25% allowing for the facilities still needed for passenger services). No expenditure on ship yards for coastal shipping is assumed. Expenditure on sea-cum-riverways and ATN is assumed to be reduced to zero, except for dredging and ATN along sea-cum-riverways mainly used by international shipping and along coastal waters (reflecting past policy towards the sector). No change in expenditure on training or other support measures is assumed reflecting the fact that all of this expenditure is needed for international shipping (partly to meet international obligations). No change in SAR costs is assumed because these fixed costs are incurred irrespective of traffic level (except for a slight reduction in on-board communications equipment).

Additional expenditure on road infrastructure is assumed to be required (but not on the railway which has spare capacity). This is approximately estimated assuming that the road traffic is distributed along a 1,000 km stretch of main road with a lane capacity of 6,000 Average Daily Traffic (ADT) measured in Personal Car Units (pcu's). Assuming that 20 ton capacity trucks (of 2.0 pcu) are used with an average load factor of 60%, and allowing for the increased distances (about 20%) involved in carrying goods by road compared to coastal shipping, it is estimated that 310 lane km are required for the extra truck traffic in 2010. At a construction cost of US \$ 0.15 million per km per lane (appropriate assuming that widening of existing roads is sufficient to increase capacity rather than building new roads) this would require US \$ 46.5 million by 2010 (plus about 30% extra for bridges).

The capital investment in shipping vessels would be reduced because of the lower traffic carried, but increased because of the continued acquisition (under Alternative 1 fleet acquisition programme described earlier) of smaller vessels without specialised designs. Coastal shipping charges are assumed to remain at current levels, reflecting the lack of any efficiency improvements proposed under the Master Plan. Road and rail expenditure is roughly estimated from current charges described in Table 4.2.15 in Section 4.2. (It is possible that road charges do not cover full road maintenance costs, but any possible underestimation of present road maintenance costs would be offset in the long run by operating efficiency improvements due to new road construction and use of larger trucks).

The expenditure incurred under the two scenarios is summarised in Table 6.4.5. The Net Present Value (NPV) of expenditure has been estimated for each scenario assuming that 33% of planned investment expenditure up to 2010 is incurred by 2000, and that annual non-capital expenditure increases at a constant annual rate from present levels (estimated from traffic forecasts to be US \$ 80 million in 1997).

Implementing the Master Plan under Scenario 1 results in significantly lower overall transport expenditure compared to Scenario 2 which involves continuing with current policies - the NPV is only US \$ 3,538 million compared to US \$ 4,479 m, a saving of US \$ 941 million. (Refer to Table 6.4.6 and 6.4.7)

Not included in this comparison are other important effects such as environmental impacts which would be particularly serious for Scenario 2 because of the increased heavy truck traffic which would increase road accidents, noise and other pollution, mainly borne by roadside communities. However this would be offset to some extent by level of service benefits to some road users arising from faster, more reliable cargo delivery times attainable from door-to-door transport by road transport on the new roads.

This cost comparison indicates the enormous cost savings to Vietnam from the use of coastal shipping, rather than road and rail alternatives, for long distance haulage of bulk cargo. The coastal shipping cost savings are increased by implementing the Master Plan recommendations for increasing efficiency. However this simple cost comparison does not take into account other potential benefits such as accident cost savings and improvements in level of service of coastal shipping.

Table 6.4.5

EXPENDITURE FROM 1997 TO 2010 FOR DIFFERENT SCENARIOS (US \$ millions)

	SCENARIO 1	SCENARIO 2
INVESTMENT COSTS		
Ports	301.9	226.4
Coastal Shipping Waterways		
- channel widening/dredging	26.0	0.0
- aids to navigation	75.3	46.8
Total Waterways	101.3	46.8
Roads	N/A	46.5
Road Bridges	N/A	14.0
Railway Infrastructure	0.0	0.0
Coastal Shipping Vessels		
- cargo ⁽¹⁾	785.2	733.7
- passenger	63.6	81.4
Total Vessels	848.8	815.1
Coastal Shipping Shipyards	31.7	0.0
Maritime Safety Vessels	169.4	169.4
Other Master Plan Costs ⁽²⁾	64.4	64.1
TOTAL INVESTMENT	1,517.5	1,382.3
ANNUAL TRANSPORT EXPENDITURE IN 2010		
Cargo Transport		
- coastal shipping	218.2	212.7
- additional road/rail	N/A	226.7
Total Cargo	218.2	439.4
Passenger Transport		
- coastal shipping	15.4	20.5
TOTAL ANNUAL EXPENDITURE	233.6	459.9
NET PRESENT VALUE 1997 - 2010 (@12%)	3,538.5	4,479.4

NOTE (1) Excluding tankers. Vessel acquisition costs for Scenario 1 based on Alternative 3 with no chartering (for cargo vessels, US \$ 922.9 million including US \$ 137.7 for tankers). For Scenario 2, cargo vessel acquisition costs are assumed to be 28% higher as estimated for Alternative 1, but 27% lower due to less coastal shipping traffic. Passenger vessel acquisition costs are assumed to be 28% higher.

(2) Sea communication equipment (US\$ 6.6 and 6.3 million in Scenarios 1 and 2), VIRES testing laboratories (US\$ 1.3 million) and VIMARU training equipment (US\$ 22.7 million) in both scenarios.

(3) Assuming coastal shipping cargo transport cost of VND 200 / ton km (VND 150 for Scenario 1).

(4) Assuming road/rail cargo transport cost of VND 580 / ton km (for road and rail costs of VND 530 and 315 respectively, a road-rail modal split of 80:20 and 20% longer hauls compared to coastal shipping).

(5) Assuming coastal shipping passenger cost of US \$ 5.7 / passenger trip (US \$ 4.3 for Scenario 1).

SOURCE: JICA Study Team

Table 6.4.6
NET PRESENT VALUE UNDER SCENARIO 1

Year	Investment	Annual Expenditure	Total Expenditure
1997	125.2	80.0	205.2
1998	125.2	86.9	212.1
1999	125.2	94.3	219.5
2000	125.2	102.4	227.6
2001	101.7	111.2	212.9
2002	101.7	120.8	222.5
2003	101.7	131.2	232.8
2004	101.7	142.4	244.1
2005	101.7	154.7	256.3
2006	101.7	168.0	269.6
2007	101.7	182.4	316.7
2008	101.7	198.0	299.7
2009	101.7	215.1	316.7
2010	101.7	233.6	335.3
TOTAL	1517.5	2021.0	3538.5
NPV	745.3	2021.0	3538.5

Conditions: Total Investment 1997-2010: US\$1,517.5 mil.
 Proportion of Investment 1997-2000: 33%
 Proportion of Investment 2001-2010: 67%
 Discount Rate: 12% annually

Table 6.4.7
NET PRESENT VALUE UNDER SCENARIO 2

Year	Investment	Annual Expenditure	Total Expenditure
1997	114.0	80.0	194.0
1998	114.0	91.5	205.6
1999	114.0	104.7	218.7
2000	114.0	119.8	233.8
2001	92.6	137.0	229.6
2002	92.6	156.7	249.3
2003	92.6	179.3	271.9
2004	92.6	205.1	297.7
2005	92.6	234.6	327.2
2006	92.6	268.4	361.0
2007	92.6	307.0	399.7
2008	92.6	351.2	443.9
2009	92.6	401.8	494.4
2010	92.6	459.9	552.5
TOTAL	1382.3	3097.1	4479.4
NPV	678.9	3097.1	4479.4

Conditions: Total Investment 1997-2010: US\$1,382.3 mil.
 Proportion of Investment 1997-2000: 33%
 Proportion of Investment 2001-2010: 67%
 Discount Rate: 12% annually

In view of this conclusion, a more detailed cost benefit analysis is carried out below which includes all important benefits.

(d) Cost-Benefit Analysis

The adopted approach of the cost benefit analysis relies on the premise that investment in modern coastal shipping vessels and infrastructure and in human resource development, reduces the costs of carrying traffic and, by offering more attractive services, attracts additional traffic. Two options are therefore compared:

- **Option 1** - increase investment and implement measures in accordance with the Master Plan proposals (as assumed for Scenario 1 above)
- **Option 2** - continue with the present low level of investment without implementing the recommendations of the Master Plan (as assumed for Scenario 2).

The additional investment costs incurred by Option 1, compared to Option 2, are regarded as costs attributable to the coastal shipping Master Plan. The additional maintenance costs of the sea-cum-riverways under Option 1 are also included. The benefits to freight traffic of the Master Plan (that is the additional benefits of Option 1 compared to Option 2) are estimated as

- (1) the reduction in cost of carrying the traffic that would already be carried under Option 2,
- (2) the reduction in cargo loss, damage and delays to traffic that would already be carried under Option 2 (referred to as level of service benefits),
- (3) increase in consumer surplus of additional traffic attracted by coastal shipping in Option 1 (conventionally assumed to be half the reductions in coastal shipping transport and cargo loss, damage and delay costs),
- (4) maritime accident cost reductions due to implementing master plan safety recommendations,
- (5) road transport accident cost reductions due to transfer of freight from road to coastal shipping.

The benefits to passenger traffic are estimated in a similar way, regarding time savings as the level of service benefits (but without including any generated traffic benefits).

However because many of the Master Plan costs are not fully attributable to coastal shipping and because the benefits of many of the proposed measures are shared between coastal shipping and other forms of transport, the evaluation of the Master Plan improvements is not straightforward. It is therefore necessary to limit the analysis to those costs and benefits that are mainly associated with coastal shipping rather than other forms of transport. Furthermore certain simplifications must be made to allow the main costs and benefits of coastal shipping to be compared meaningfully.

Accordingly the following assumptions are adopted.

- Traffic carried by coastal shipping and other modes under Options 1 and 2 is assumed to be the same as under Scenarios 1 and 2 respectively.
- The costs and benefits associated with the transport by coastal shipping of oil products are not included in the evaluation of the Master Plan (as described above, oil transport should be considered as part of the overall evaluation of the Dung Quat project which is beyond the scope of the Master Plan). This requires the coastal shipping infrastructure improvements to be justified on the basis of benefits to non-oil traffic alone (effectively as if the Dung Quat project is not implemented).
- Capital costs under Options 1 and 2 are estimated on the same basis as described in Table 6.4.5 for investment costs of Scenarios 1 and 2 (assuming that these financial costs approximate economic costs without distortions such as taxes and subsidies).
- In addition to capital costs, it is assumed that Option 1 also incurs extra maintenance costs (compared to Option 2) of 556 km of sea-cum-riverways used mainly by sea-cum-riverways (US \$ 1.1 and 1.5 million in 2000 and 2010 respectively based on the rates per km given in Section 6.3.4). These figures represent only about 67% of total expected sea-cum-riverway maintenance costs (the rest is spent on 276 km of sea-cum-riverways used mainly by international shipping).
- Annual benefits are estimated between 1997 and 2010 by extrapolation, assuming uniform increase from zero in 1997 to the estimated 2010 figure. Benefits of the Master Plan after 2010 are excluded. The proposed investments in vessels, infrastructure and human resources would continue to produce benefits after the period of the Master Plan. Excluding them therefore underestimates total benefits.
- The economic operating cost benefits of coastal shipping are derived from the lower costs associated with increasing the average non-oil cargo ship size from 1,000 to 1,500 DWT by 2010 (as assumed in the comparison of scenarios above). A similar change is assumed for passenger vessels. The operating cost savings are estimated in Table 6.4.8. No cost savings in loading or unloading are assumed which would, in practice, increase benefits.
- Level of service benefits for cargo traffic are assumed to be 15% of operating cost change benefits: these benefits, which consist of reductions in loss and damage of cargo and reductions in inventory sizes are typically much less than cost savings for shipping improvement projects.

Table 6.4.8
BENEFITS FROM COASTAL SHIPPING MASTER PLAN IN 2010

Item of Benefit	Calculation of Benefit	Value of Benefit (US \$ million)
Freight Traffic		
(a) Cost saving to existing traffic ⁽¹⁾	(Ton km carried under Option 1)x(Cost per ton km)x(Proportional reduction in cost) = US \$ (11.7 billion) x (0.0104) x (0.25) million	30.4
(b) Level of Service improvement to existing traffic	(15%) x (Benefit (a))	4.6
(c) Consumer surplus of traffic transferring to coastal shipping	(Ton km attracted to coastal shipping)x(Reduction in cost)x(1.15 level of service improvement)/2 = US \$ (16.0 - 11.7 billion) x (0.0026) x (1.15) / 2	6.4
Passenger Traffic		
(d) Cost saving ⁽²⁾	(Passengers carried)x(Cost per passenger)x(Proportional reduction in cost) = US \$ (3,590 thousand) x (5.7) x (0.25)	5.1
(e) Passenger time saving	(Passengers carried)x(Average Trip time in hours)x(Proportional reduction in trip time)x(Value of time per hour) = US \$ (3,590 thousand)x(2 hours)x(0.10)x(2.5)	1.8
Accident and Environmental Benefits		
(f) Reduction in Maritime Accident Costs	(Cost per accident/2)x (ton kmxaccident rate/ton km for Option 1)- (ton kmxaccident rate/ton km for Option 2)= US \$ (0.18/2 million) x (11.7 x 8-16.0 x 5)	1.2
(g) Reduction in Road/Rail Accident Costs	(Cost per accident)x(Extra million veh. km for Option 1)x(Accident rate/million veh km)= US \$ 4,050 x 344 x 3.0	4.2
Total Annual Benefits		53.7

NOTE: (1) Freight transport economic operating costs (excluding depreciation) are estimated in Appendix 7 of Maritime Industry Report for 1,000 and 1,500 DWT general cargo vessels as VND 114.3 and 86.1 per tonne km respectively.

(2) Passenger transport economic operating costs are roughly estimated from current fares as described in the text.

- Level of service benefits for passengers (including foreign tourists who are expected to constitute 67% of all coastal shipping passengers in 2010) are estimated from the forecast number of trips, expected time saved (10% on a two hour trip using improved ships) and value of time savings for passengers. These benefits are expected to be much less than passenger vessel operating cost savings because of the low value of time for Vietnamese (estimated from the future wage rate as US \$ 0.75 per hour) and because foreigners' value of time would be relatively low because they are using shipping services for leisure purposes, estimated as US \$ 2.5 per hour).
- Implementing the Master Plan is assumed to reduce the overall maritime accident rate (excluding fishing boat accidents) from 8 (as found at present) to 5 accidents per billion tonne km (comparable with figures found in other countries in the region). Half of these accidents are assumed to involve coastal shipping rather than international shipping. The average cost per accident is estimated in Table 6.4.7 as VND 2.0 billion.
- Implementing the Master Plan is also assumed to reduce the number of road accidents which would result from 4.3 billion ton km of coastal shipping traffic being transferred to road and rail (as assumed for Scenario 2 above). A typical future accident rate that can be expected in Vietnam is about 3.0 per million vehicle km (compared to between 0.3 and 6.0 in most other countries), with an average cost of about VND 44.6 million (see Table 6.4.9).

In overall terms the effect of these simplifying assumptions is that total benefits of the Master Plan improvements are possibly underestimated. Because of this conservative approach to estimating benefits the evaluation results can be used with confidence to determine if minimum benefit:cost ratios are achieved.

The net benefits of the Master Plan are estimated over the period from 1997 to 2010 assuming that benefits increase annually, at a constant rate, from zero in 1997 to the total figure estimated in Table 6.4.6 of US \$ 53.7 million. Investment costs attributable to the Master Plan, estimated as the difference in the investment costs in Table 6.4.5 for Scenarios 1 and 2, are assumed to be split in the ratio 33:67 over the short and long terms (up to 2000 and between 2001 and 2010). Additional sea-cum-riverway maintenance costs rise from zero to US \$ 1.1 million in 2000 and US \$ 1.5 million in 2010. This results in Net Present Values (at 12% discount rate) of costs and benefits of US \$ 72.5 and 129.6 million respectively, giving net benefits of US \$ 57.1 million. The Internal Rate of Return of the net benefit stream is 34% as shown in Table 6.4.10.

The ratio of benefits to costs is very high and would, in practice, be even higher if all possible benefits were included. The economic rate of return is well above the normal lower limit (about 12%) required to justify projects in Vietnam and suggests that many of the projects in the Master Plan would produce similar if not higher returns.

Table 6.4.9
ESTIMATION OF COST OF ACCIDENTS

MARITIME ACCIDENTS

(a) Deaths

For the purpose of assigning a value to deaths caused by maritime accidents, the economic value of a life has been estimated from the lost earnings. Since most deaths occur to seamen, the average earnings of seamen have been used (estimated as currently VND 1,760 per month for a 1,000 DWT vessel, in Appendix 6 of the Supplementary Report on the Maritime Transport Industry). The future earnings have been estimated assuming a 10% annual real growth in earnings, over a remaining lifetime of 20 years, at an annual discount rate of 12%. This produces a value of a death of VND 358 million. Assuming 0.15 deaths per accident (estimated approximately from the poor statistics available in Vietnam), this gives VND 54 million per accident. Not included in this figure is any allowance for the pain and suffering caused by deaths.

(b) Vessel Loss and Damage (excluding damage to third parties)

It is assumed that accidents result in virtually a complete loss of the vessel for 5% of accidents (incurring an average loss of VND 10 billion), cause serious damage for 35% of accidents (costing VND 2 billion) and cause only minor damage in the rest (costing VND 0.5 billion). This results in an average vessel loss and damage cost of VND 1,500 million per accident.

(c) Other Property Damage

It is assumed that 15% of accidents involve collisions with other vessels or structures and cause an additional VND 1.5 billion worth of damage. Other accidents are assumed to result in no other property damage. This represents VND 225 million per accident.

(d) Salvage Cost

It is assumed that 50% of accidents require salvage services costing VND 0.5 billion, representing 2% of the value of the vessel when new. This is equivalent to taking the salvage cost as about 20% of the scrap value. This results in an average cost per accident of VND 250 million.

Based on these assumptions the total cost per maritime accident is VND 2,029 million (US \$ 0.18 million).

ROAD TRANSPORT COSTS

(a) Deaths

It is assumed that there are 0.1 deaths per accident (a typical value found in many countries). Assuming the same value per death as for maritime accidents, the cost of deaths is VND 35.8 million per accident.

(b) Injuries

It is assumed that there are 1.0 injuries per accident, as found in other countries, and the cost of medical treatment is estimated roughly as VND 5 million (for five days hospital treatment). The cost of lost output attributable to an injury is estimated assuming ten days of work at VND 80,000 per day (representing VND 0.8 million per injury). This gives a total cost per injury of VND 5.8 million.

(c) Damage

The cost of damage to vehicles and property is roughly estimated as VND 3.0 million per accident.

Based on these assumptions the total cost per road accident is VND 44.6 million (US \$ 4,050).

Table 6.4.10
BENEFIT - COST STREAM

Year	Capital Costs	Maintenance Costs	Benefits	Net Benefits
1997	11.15	0.00	0.00	-11.15
1998	11.15	0.37	4.13	-7.39
1999	11.15	0.73	8.26	-3.63
2000	11.15	1.10	12.39	0.14
2001	9.06	1.13	16.52	6.33
2002	9.06	1.17	20.65	10.43
2003	9.06	1.21	24.78	14.52
2004	9.06	1.25	28.92	18.61
2005	9.06	1.28	33.05	22.70
2006	9.06	1.32	37.18	26.79
2007	9.06	1.37	41.31	30.88
2008	9.06	1.41	45.44	34.97
2009	9.06	1.45	49.57	39.06
2010	9.06	1.50	53.70	43.14
TOTAL	135.20	15.30	375.90	225.40
NPV	66.41	6.08	129.55	57.06

Conditions : Capital costs are the difference in investment costs between Scenario 1 and 2.

Additional maintenance cost of Scenario 1 = US\$1.1 mil. in 2000

Additional maintenance cost of Scenario 2 = US\$1.5 mil. in 2010

Discount Rate: 12% annually

Result : EIRR: 34%

6.4.2 Financing Arrangements

This section compares the projected cost of the Master Plan with the potential finance from various sources. Taking account of likely constraints on finance in Vietnam, suggestions are made about how to implement and finance the Master Plan. The analysis concentrates on the short term financial need in order to establish the base investment level for coastal shipping in the immediate future. This enables long term plans to be built on a firm foundation.

Firstly, the overall level of finance likely to be available to international and coastal shipping is estimated. Then the infrastructure and equipment investment needs are assessed for coastal shipping.

(a) Finance Available to Shipping

The finance available to shipping depends on

- funds available to the transport sector in Vietnam, and
- the proportion of transport funds allocated to shipping.

The first factor is dependent on macro-economic policy and conditions, and is determined by government through decision makers in MPI and MOF. The availability of foreign finance from ODA and direct investment are key variables in determining investment policy. The second factor is dependent on transport policy determined by MOT, particularly regarding infrastructure investment plans for different modes and degree of encouragement given to investment (especially foreign investment).

The total investment in all sectors for the five years 1996-2000 has been determined by the government to be US \$ 41-41 billion, as described in Section 2.4.1. About US \$ 34 billion would be expected to be invested in the four years from 1997 to 2000. This is the investment required in order to achieve the economic growth targets of the country. Approximately half of this investment is intended to be derived from domestic sources.

According to World Bank estimate, Vietnam needs to allocate, through the public sector, about 2.4% of GDP to infrastructure construction and improvement. A further 0.6% of GDP should be allocated for routine maintenance of the infrastructure (mainly roads). In addition, about 1.5-2.0% of GDP is likely to be spent by state and non-state sectors on equipment and commercial infrastructure such as vehicles, ships airports and sea ports.

Using this investment guideline, total investment funds available to the transport sector were estimated in Section 2.4.1 as US \$ 6-7 billion from 1996 to 2000. For the four years from 1997 to 2000, this amounts to US \$ 5.7 billion (excluding infrastructure maintenance). This is less than the US \$ 9.0 billion estimated by MOT to be needed from 1996 to 2000, which is considered to be unrealistically high, given the economic circumstances of the country.

Also shown in Table 2.4.2 of Section 2.4.2 is the allocation of MOT's US \$ 9.0 billion investment between modes. For sea transport (both international and coastal shipping) US \$ 0.8 billion is planned. A further US \$ 0.3 billion is planned for inland waterways. Reducing the total investment from US \$ 9.0 to 5.7 billion, requires a reallocation of investment priorities between modes. We consider two options: equal cuts between modes and greater priority to sea and inland water transport (at the expense of rail and air transport).

Under the first option, investment in shipping would decrease to US \$ 0.5 billion, while under the second option, shipping investment would be maintained at US \$ 0.8 billion, and US \$ 0.3 billion would be allocated to inland waterways. Assuming no change in road investment (which, at US \$ 3.3 billion, seems reasonable because funds for many

planned road schemes have already been committed), this would imply that rail and air investment would be limited to only US \$ 1.3 billion.

Between 2000 and 2010, the World Bank anticipates a lower investment requirement in transport infrastructure. For example government expenditure on construction and maintenance of transport infrastructure is anticipated to fall from 3% to no more than 2.5% of GDP. Allowing for 0.6% of GDP for maintenance (which would increase in cost as the infrastructure is developed), this would imply 1.9% of GDP for construction and improvement. If other investment in equipment and commercial facilities remains the same, at 1.5-2.0% of GDP, this implies only 3.7% of GDP would be spent on transport investment. With forecast GDP growing, between 2000 and 2010, from US \$ 36-37 billion to US \$ 94-106 billion, this would imply annual investment increasing from about US \$ 1.3 to 3.7 billion over the long term (a total of US \$ 22 billion over the ten years). This is more than MOT's projected investment plan which anticipated only US \$ 19.0 billion over the same period. However assuming postponement of important projects planned up to 2000, the total investment would be US \$ 22 billion, which is the same as estimated resources using the World Bank's guidelines.

Since the long term financial requirement in the transport sector could be satisfied with projected resources, it is assumed that all MOT planned long term investment in shipping (US \$ 3.0 billion, as shown in Table 2.4.2) is made by 2010. This implies that, between 2000 and 2010, investment in coastal and international shipping would be US \$ 2.5 billion under the first option (including US \$ 0.3 billion postponed from before 2000) and US \$ 2.2 billion under the second option. This is indicated in Table 6.4.11. A further US \$ 1.0 billion would be allocated to inland waterways.

Table 6.4.11
ESTIMATION OF ADDITIONAL FINANCE REQUIRED
FOR COASTAL SHIPPING
(US \$ billions)

	Up to 2000	2000 to 2010	Total
Planned Shipping Investment			
- Option 1	0.50	2.50	3.00
- Option 2	0.80	2.20	3.00
Coastal Shipping Finance Needed			
- According to Master Plan	0.57	1.18	1.75
- Minimum Requirement	0.36	1.15	1.51
Finance Available for Coastal Shipping			
- Residual for Coastal Shipping	-0.20	0.70	0.50
- Additional Finance Needed	0.56 to 0.77	0.45 to 0.48	1.01 to 1.25

(b) Investment Requirement for Coastal Shipping

The Master Plan projects a coastal shipping investment expenditure in Table 6.4.1 of US \$ 1.75 billion up to 2010, of which US \$ 0.57 billion is needed up to 2000 (see Table 6.4.8). This is 55% of all projected long term investment in shipping (71% of all investment in the short term).

The government gives high priority to developing international shipping and is planning to spend US \$ 1.5 billion on the major international ports by 2010 (including US \$ 0.5 billion of ODA finance, alone, by 2000). With the Prime Minister's approval, it is also planning to invest US \$ 0.5 billion on developing the VINALINES fleet (mainly for international shipping purposes) up to 2000, and possibly a further US \$ 0.5 billion between 2000 and 2010. The total investment anticipated in shipping, just from these particular projects, would amount to US \$ 2.5 billion, which is 83% of the total anticipated investment in shipping. Assuming that all the rest was allocated to coastal shipping, a surplus of only US \$ 0.5 billion would be available for coastal shipping ports, sea-cum-riverways, vessels and other equipment up to 2010, as shown in Table 6.4.8.

According to current investment plans, there is less than one third of the required resources to fund the coastal shipping Master Plan. In the short term, there are no surplus resources at all for coastal shipping because projected investment before 2000, in international shipping ports and vessels, exceeds US \$ 1.0 billion, which is even more than the total of US \$ 0.8 billion allocated by MOT for the subsector. Instead there is a deficit of US \$ 0.2 billion as shown in Table 6.4.8.

(c) Options for Financing Coastal Shipping

There are three broad approaches (not mutually exclusive) for matching investment requirements and supply of finance for coastal shipping:

- increase the allocation of investment to the shipping sector,
- reallocate investment from international to coastal shipping, or
- reduce investment in coastal shipping.

The scope for each approach is discussed below.

1) Increase Investment in Shipping

This would either require an increase in overall transport investment or a reallocation from other modes of transport. The scope for an increase in transport investment seems rather small because the government already accords considerable priority to transport. The above projections assume that 17% of total short term investment in Vietnam (US \$ 5.7 billion out of US \$ 34 billion from 1996 to 2000) is allocated to the transport sector, which is rather high. Therefore it seems reasonable to assume that this proportion cannot increase any further.

By contrast the scope for reallocating investment from other modes is considerable. According to the Master Plan traffic forecasts, the role of coastal shipping will increase in future because of the growth in domestic bulk haulage over long distances. Existing government investment plans have largely ignored the potential of coastal shipping. Consequently there is a very strong case for reviewing the allocation of investment resources for infrastructure in domestic transport and, if appropriate, reallocating resources from roads and railways to coastal shipping. Once the infrastructure is in place, together with appropriate policy frameworks, the allocation of transport equipment can be left largely to market forces. An increase in investment in coastal shipping vessels and other equipment would be expected to follow, accompanied by a decrease in anticipated investment in road and rail equipment, causing an even greater reallocation from road and rail to coastal shipping.

2) Reallocate Investment from International Shipping

There is also scope for reallocating investment from international to coastal shipping. Developing coastal shipping reduces distribution costs, especially between the North and South. This enables the country's new industries to be even more competitive with international competitors than they would be without coastal shipping. This in turn would have an impact on trade flows - increased distribution within Vietnam would cause less imports from outside. The effect of this would be to reduce investment requirements in international shipping and increase those in coastal shipping, at least to some extent.

Fortunately many port facilities used by international shipping can be reallocated to domestic shipping, so this reduces the dangers of misallocation of investment resources in shipping. There is also some scope for redeploying vessels, despite the obvious

differences in designs. The latter can be expected to take place in response to market forces, provided no regulatory obstacles are created.

These considerations call for continued monitoring of port capacity in Vietnam to ensure that the appropriate balance between international and coastal shipping is found. The supply of multi-purpose berths located close to the production and consumption centres, which can be used by both types of shipping, should be given high priority. Development of specialised deep sea ports which are not needed by coastal shipping are of less importance in this regard.

3) Reduce Coastal Shipping Investment

There is considerable scope in the short term for reducing investment in coastal shipping, especially in the supply of equipment, which amounts to US \$ 1.0 billion (only US \$ 0.2 billion up to 2000). This is because some old vessels can be reallocated from international routes (where they may not be competitive) and vessels can be leased or chartered instead of being purchased. In addition second-hand rather than new vessels can be purchased. It is estimated in Section 6.3.3 that vessel investment costs could be reduced in the short term by about 30% through chartering. An even greater reduction in short term investment costs could be achieved if vessels are reassigned from international routes - perhaps by 50%.

The high level of investment in the main ports could reduce coastal shipping port requirements (mainly in the short term). There may also be scope for postponing non-essential investment such as replacing old equipment. The extent to which this is possible is difficult to quantify, but it could be as much as 30%, reducing port investment from US \$ 0.2 billion to about US \$ 0.15 billion over the short term. There is little scope for reducing investment in sea-cum-riverways if coastal shipping is to achieve its intended benefits. However this investment is relatively modest. Other investments proposed in the Master Plan concern ATN, SAR and Sea Communications. Most of these investments, amounting to over US \$ 0.3 billion (US \$ 0.1 in the short term), would be required even without coastal shipping. The main scope for reduction here depends on the level of safety required for all types of shipping and fishing activities. As is always the case in such circumstances, there is significant scope for reduction provided that the increased loss of life and property is considered acceptable by decision makers. However the need to meet international obligations means that certain sea communication equipment is essential. Therefore the potential reduction is about 30%, over both short and long terms.

Taking account of these considerations the potential long term coastal shipping investment requirement could be reduced to about US \$ 1.51 billion (US \$ 0.36 billion in the short term). See Table 6.4.8 for details.

(d) Recommended Financing Strategy

Under current policies the finance available for coastal shipping is completely inadequate and does not take account of the relative needs of coastal shipping compared to other modes. In general terms, this requires

- an increase in the allocation of public finance to the shipping sector, especially in the short term,
- which is achievable mainly by reallocating funds from road, rail and international shipping projects which are less justifiable than the ones proposed for coastal shipping in the Master Plan,
- seeking ODA support for key infrastructure, training and safety projects in the Master Plan,
- setting user charges for infrastructure to cover investment costs,
- reassigning vessels currently used in international shipping to use in coastal shipping,
- continued careful scrutiny of all investments in the transport sector to identify those yielding the most benefit with limited resources, and
- encouraging domestic and foreign investment in the maritime transport industry through market-oriented policy reforms.

In addition to the US \$ 0.50 billion of all kinds of investment that appears to be allocated to coastal shipping up to 2010, a further US \$ 1.25 billion is required (or only US \$ 1.01 billion if safety systems are developed at a slower rate). This represents only 5% of planned investment in other modes and so reallocating such an amount is feasible. In the short term, the additional finance required is between US \$ 0.56 and 0.77 billion which is also about 5% of expected transport investment. The following section outlines ways to implement the recommended strategy.

(e) Implementing Considerations

To meet the financing needs of coastal shipping both domestic and foreign sources must be considered. Different considerations apply to infrastructure, which can mainly be provided through government sources with assistance from ODA, and other capital requirements such as transport equipment which have to be provided through commercial business activities.

Domestic finance is potentially available from

- credit sources such as banks or government sources,
- reinvestment of accumulated capital, and
- in future, the Vietnamese stock market.

In addition, foreign credit is available from

- direct foreign investment from particular foreign organisations or individuals,

- ODA investments, and
- leasing arrangements (either financial leasing or operational leasing).

Most transport infrastructure investment is incorporated into the government's public investment plan (PIP) which included US \$ 15.6 billion worth of projects for the period from 1996 to 2000. This is 37% of total investment. Included in this (as shown in Table 2.4.1) is most of the US \$ 7-8 billion expected to be supplied by ODA sources). This implies that ODA funds would meet about half of the planned public investment. Direct foreign investment can also be an important foreign source in shipping transport, but this would be mainly directed towards international shipping ports and related investments.

The domestic portion of infrastructure investment would mainly be expected to come from the budget and from loans (often supported by government loan guarantees) and reinvestments of accumulated capital (from user charge revenue).

So far there are few projects in the government's public investment plan which would develop the ports and sea-cum-riverways used by coastal shipping. The first step in implementing the Master Plan is therefore to incorporate the infrastructure projects proposed for coastal shipping into the PIP and invite ODA support for them. In the first instance, further feasibility studies would be necessary for major investments. These could also be funded by ODA sources. The user charges for ports and waterways used by coastal shipping must be reviewed to ensure that loans for infrastructure development can be repaid. In the long term, any revisions to the PIP must incorporate the investment needs of coastal shipping. The user charges must also be reviewed from time to time to ensure that adequate finance is available for both maintenance and further expansion and renewal of facilities.

The main source of domestic finance for the maritime shipping industry is probably reinvestment of accumulated profits (often from other non-shipping businesses such as trading, frequently involving transfers between family members). However limited profits and the uncertain business environment mean that these sources have extremely limited potential to develop the coastal shipping fleet.

Other domestic sources are of limited use to the maritime industry. Banks are unwilling to loan to most ship operators because of the risks involved and operators can offer little in the way of collateral. Only state-owned operators can hope to receive the necessary credit guarantees to be able to tap this finance source. The stock market is an important potential additional source of affordable credit but this has yet to be introduced (although government plans to introduce it before 2000 once the legal and institutional basis for this has become established). Vietnam's stock market would allow shipping operators to raise capital from a wide range of investors at lower cost than bank loans. Experience in other countries suggests that this will mainly be of assistance to the large shipping companies with US\$ 5 million or more of assets. Smaller operators are usually

wholly-owned businesses rather than joint-stock companies and so would not obtain capital from the stock market.

Direct foreign investment is an important source of finance for the maritime transport industry and can be on the basis of either equity involvement or through loans. Foreign commercial banks are prepared to loan capital to Vietnamese companies provided certain conditions are satisfied. Often some form of political insurance is required against the possibility that the borrower cannot repay the loan, other than due to normal business difficulties. This insurance adds to the borrowing costs which may already be high because of the risks involved. The borrower must be able to convince the bank of the technical and financial viability of the investment. In this context, using foreign management who have experience of such investments helps to reassure the banks.

Under the government's foreign investment law there are three forms of foreign participation:

- joint venture enterprises or corporations between Vietnamese and foreign partners,
- establishing a 100% foreign owned enterprise, and
- making a business contract between Vietnamese and foreign partners.

In the absence of a stock market the options for joint Vietnamese and foreign partnerships are rather limited. For example an enterprise with only a minority foreign equity share holding may well be categorised as a 100% foreign owned enterprise. The rules for using, in domestic shipping, Vietnamese registered ships owned partly by foreign organisations or individuals (including all 100% foreign owned enterprises) are extremely restrictive. On the other hand exceptions can be made for foreign vessels used on an own-account basis provided they do not carry goods for third parties.

In all cases of foreign investment approval is required from the MPI but the rules for giving permission are not defined. Furthermore establishing shipping companies is subject to authorisation by the Prime Minister (through a licensing system which imposes numerous conditions). Not surprisingly, given all these layers of controls, potential foreign investors are confused about government policy towards foreign investment in domestic shipping and how this is likely to be interpreted by VINAMARINE. This therefore deters direct foreign investment.

The use of ODA funds in the maritime transport industry is very limited because lending agencies require many conditions (related to developmental and commercial objectives) to be fulfilled which requires lengthy processing procedures, and on-lending arrangements have to be established which takes time.

Leasing schemes are a potentially important source of finance to the maritime industry which has yet to be exploited in Vietnam. There are two types of schemes:

- financial leasing, in which a leasing company purchases the vessel or other equipment and then resells it to the operator under a hire purchase agreement which covers the cost of credit, and
- operational leasing, in which a leasing company purchases the vessel and then rents it to an operator.

Under the first scheme the operator repays the total cost of the vessel over several years and then keeps the vessel. The lease agreement usually places responsibility for maintenance of the vessel on the operator, who therefore has an incentive to keep the vessel in good condition. Under the second scheme ownership remains with the leasing company who therefore undertake maintenance. The practice of chartering vessels is often one form of operational leasing that may also involve providing the crew to operate the vessel.

There are at present no leasing companies in Vietnam who appear to be able to provide financial leasing services for new vessels (or imported second-hand vessels). The International Finance Corporation (IFC) of the World Bank is currently establishing a leasing company in Vietnam but it is likely that this would specialise in leasing assets smaller than ships. Therefore shipping operators will probably have to rely on foreign leasing services for the foreseeable future.

The review of available financial resources above suggests that the following policy measures could assist in improving the supply of finance for the maritime transport industry.

- (1) In the first place the government should continue to provide a stable business environment with stable prices, low interest rates, a convertible exchange rate and transparent regulatory framework for business.
- (2) The establishment of the Vietnamese stock market is a priority measure which can provide the cheapest possible finance for larger shipping companies.
- (3) The terms of domestic credit should be made much more transparent so that potential borrowers can be treated on a more equitable basis and credit directed to the most promising borrowers.
- (4) The government should, at an early opportunity, make its policy clear regarding foreign investment in the shipping business, and in the domestic coastal market in particular.
- (5) The government should consider relaxing and making clearer the rules concerning involvement in domestic shipping of Vietnamese organisations that have a foreign participation of over 50%. This could achieve the following aims.
 - To enable Vietnamese operators to enter the business with foreign partners in order to accumulate capital which could eventually be used to establish wholly Vietnamese owned companies.

- To develop new types of services using foreign expertise and capital which Vietnamese operators would otherwise find to be impossible. Examples of these include liner services and use of specialised vessels.
- To allow the full development of the Vietnamese general cargo fleet without distortions caused by concessions being given to foreign own-account vessels.

This could, for example, include start-up concessions that allowed majority foreign-owned Vietnamese companies to carry domestic traffic for a period after entering the business. Such concessions could also be given to operators that introduced modern vessels suitable for innovative services such as liner services.

- (6) To provide credit for the coastal shipping business, the government should encourage ODA funds from OECF and other sources to be channelled into the sector to ensure that coastal shipping plays its full role in domestic transport.
- (7) Finally to minimise the cost of ship acquisition and allow Vietnamese operators to compete on the same basis as others on international routes and obtain the particular vessels which they need, the government should desist from any policy aimed at restricting choice - for example, through restrictions on imports of small or old vessels in order to support local ship building businesses.

6.4.3 Environmental Consideration

This initial environmental examination (IEE) has been undertaken for the projects which in the Master Plan and are concerned with possible environmental degradation during and after is implementation of the plan. These projects are related to shipyards, ports, specialized cargo transportation such as oil and cement, and increased coastal shipping traffic generally.

(a) Shipyards

In the Master Plan, three shipyards will be improved for building new vessels and another six shipyards improved for repairing coastal shipping vessels.

Possible adverse effects are anticipated in the form of

- dust and water pollution caused by scraping, cleaning and painting vessel hulls,
- noise and vibration caused by chipping, scrapping hulls with hammers and sandblasters, and
- treatment of oil sludge, residue, garbage and other waste from ships in dockyards.

The above pollution can be prevented by the following measures:

- net fencing to control dust and, especially, paint spray
- shore tanks to segregate residues such as oil and waste paint from water

- incinerators
- onshore garbage collection

(b) Coastal Shipping Ports

The Master Plan selected 17 coastal shipping ports to serve local areas of economic importance. The IEE indicated the possible environmental impact of proposed developments at each port. (Refer to Table 6.4.12)

- Most of the port wharf expansion will be done by means of piling work, requiring neither dredging nor reclamation. No major negative impact is anticipated.
- However, Cua Lo and Nha Trang ports need reclamation. Prior to the reclamation, geological and environmental surveys should be conducted in compliance with instructions from a local responsible agency (usually Department of Science, Technology and Environment (DOSTE) in each province).
- Soil disposal after dredging work at Cua Lo and Danang shall be adequately laid aside on an area designated by the local responsible agency.
- Creation of additional apron space is planned at several ports by covering vacant sections between yards and bridged wharves. This will contribute to protection of water pollution because it reduces the amount of debris, such as coal, cement, phosphate, etc., reaching the water.
- For the construction of breakwaters at Cua Lo and Danang ports, the implementation program including a current flow survey and an EIA report should be submitted to a local responsible agency.

(c) Specialized Cargo Transport

Oil: In response to the Dung Quat Oil Refinery Project, which will intensify coastal oil haulage a great deal, a nationwide oil spill protection system will have to be established.

Cement: The most serious pollution is dust emission at factories and at ports during cargo handling. In factories, a mechanical air filter would be effective in reducing dust emission below the critical limit (100 mg/m³) of Standard of Vietnam, TCVN 5939-1995. At ports and on ships, bulk cement is more hazardous than bagged cement. Covered conveyors and hatched decks are required for safeguarding seafarers and stevedores.

Table 6.4.12
IEE MATRIX FOR REHABILITATION AND DEVELOPMENT OF
COASTAL SHIPPING PORTS

No.	Name of Port	Kinds of Rehabilitation & Development	Kinds of Environmental Impact
A. Northern Region			
1.	Haiphong	No dredging/No special development required	No special assessment required
2.	Cai Lan	Construction of three berths/Dredging (Cai Lan Port Construction Project by JICA)	Pollution of water and earth/Change in topography and underground water system - Dredged soil; 8,000,000 m ³ /Use of Dredged soil; 2,300,000 m ³ /Soil removal; 5,700,000 m ³
3.	Hanoi	• Construction of new berth by piling	Pollution of water and earth
4.	Viet Tri	• Construction of new berth by piling Phosphate rock loading; 140,000 tons (2000-2010)	• Pollution of water and earth • Phosphate dust pollution
5.	Ninh Binh	• Construction of Ninh Phuc area: Extension 80 M by piling	Pollution of water and earth
B. Central Region			
6.	Cua Lo	• Construction of three berths by piling • Construction of a breakwater (1 km) to protect water way from sediments • Dredging work at berth front/access route	• Pollution of water and earth • Dredged soil; 800,000 m ³ - Use for Berth Apron; 400,000 m ³ /Excess soil; 400,000 m ³
7.	Ha Tinh - Quag Binh Port	• New berths will be required up to 2010	•
8.	Thuan An	• Pavement of yards required	No special impact expected
9.	Danang	• Construction of a breakwater at Tien Sa Area (600 m) • Construction of one jetty by piling • Dredging • Increase of coal handling; 90,000 tons (2010)	• No special impact expected • Dredged soil 300,000 m ³ must be treated on shore/Pollution of water and earth • Dust pollution will be increased
10.	Qui Nhong	No special development required	No assessment required
11.	Nha Trang	• Construction of two berths (jetty type) by piling, and material is required for pavement of yards	• Pollution of water and earth • Dust and water pollution due to reclamation • Impact on coral reef and sea products may be anticipated
C. Southern Region			
12.	Saigon	No special development required	No assessment required
13.	Dong Nai	• Construction of two berths by piling (180 m) • No dredging but yard pavement required on vacant section	• Pollution of water and earth
14.	My Tho	• Extension of existing wharves by piling (63m to 100m) • Yard pavement required on vacant section	• Pollution of water and earth
15.	Dong Thap	• Yard pavement required on vacant section • Extension of existing wharves by piling (68m to 100m)	• Pollution of water and earth
16.	Can Tho	• Yard pavement required on vacant section (no change in length of wharves; 148 m)	• Water pollution due to reclamation
17.	My Thoi	• Extension of wharves by piling (76m to 100m) • Yard pavement required on vacant section	• Pollution of water and earth

Coal: Coal dust is also harmful and should be reduced to below 400 mg/m³ in any place. The countermeasures are sprinkling water over stacked coal and covered conveyors on ships. In addition, dirty water from coal should be treated in bilge tanks.

(d) Increase in Coastal Shipping Traffic

The Master Plan predicts that coastal shipping movement will increase substantially. This implies that increasing numbers of accidents ships and accidents may cause deterioration of the marine environment. We cannot expect just one measure effective in controlling degradation of the environment. A comprehensive approach is essential. This requires:

- upgrading of seafarers education,
- strict enforcement of ship inspection and port state control,
- installation of navigational aids
- establishment of SAR system
- legislation and organization of marine pollution control system

6.4.4 Short Term Priorities

All the projects in the Master Plan have been proposed because they meet its overall objectives of expansion of coastal shipping in accordance with demand, as part of a competitive transport system, linking the Economic Focal Areas with other parts of the country, and providing for safety and environmental controls where justified. The projects have been further reviewed in order to select those which are crucial to implement in the short term, up to 2000, in order to achieve the development anticipated in the Master Plan.

Those projects which should be considered for implementation in the short term are those which:

- are likely to give economic returns above some minimum level (about 12%) in the short term,
- are financially and technically feasible, likely to have an immediate supply of finance and no serious implementation obstacles,
- offer benefits covering a large area and many beneficiaries,
- are important links in the Master Plan, without which implementation of the Plan would be delayed, especially concerning the main issue about how to develop the main north-south corridor, and
- they must be urgent, with serious consequences in the short term if implementation is delayed.

The results of the review are summarized in Table 6.4.13, which lists all of the possible projects proposed in the Master Plan, their approximate phasing and estimated costs.

Table 6.4.13
LIST OF PROPOSED PROJECTS

(1/2)

PROPOSED PROGRAMS AND PROJECTS	IMPLEMENTATION SCHEDULE			COST ESTIMATION (US\$M.)		
	1997-2000	2001-2005	2006-2010	1997-2000	2001-2010	TOTAL
FLEET EXPANSION AND MODERNIZATION PROGRAM				234.5	784.0	1018.5
F-1) Fleet Development and Its Financial Support				225.9	760.6	986.5
F-2) Introduction of Standardized Cargo Vessel				0.0	neg.	neg.
F-3) Improvement of Ship Construction Yards						
(F-3-1) Bach Dang Shipyard				0.0	5.7	5.7
(F-3-2) Ha Long Shipyard				0.0	5.3	5.3
(F-3-3) Ben Kien Shipyard				0.0	3.3	3.3
F-4) Improvement of Ship Repair Yards						
(F-4-1) Nam Trieu Shipyard				4.2	0.0	4.2
(F-4-2) Song Han Shipyard				2.7	0.0	2.7
(F-4-3) CK-76 Shipyard				1.7	0.0	1.7
(F-4-4) Nam Ha, Ben Thuy, Bin Trieu Shipyards				0.0	8.2	8.2
F-5) Safety Quality Management				0.0	0.6	0.6
PORTS AND WATERWAYS DEVELOPMENT PROGRAM				212.7	115.0	327.7
I-1) Development of Coastal Shipping Ports						
(I-1-1) Haiphong Port				12.2	1.0	13.2
(I-1-2) Hanoi Port				5.8	0.1	5.9
(I-1-3) Viet Tri Port				5.0	0.0	5.0
(I-1-4) Ninh Binh Port				2.9	5.0	7.9
(I-1-5) Cua Lo Port				40.7	23.3	64.0
(I-1-6) Thuan An Port				0.6	2.2	2.8
(I-1-7) Danang Port				42.7	24.6	67.3
(I-1-8) Qui Nhon Port				14.3	1.0	15.3
(I-1-9) Nha Trang Port				24.2	1.5	25.7
(I-1-10) Saigon Port				13.9	0.0	13.9
(I-1-11) Dong Nai Port				4.2	5.0	9.2
(I-1-12) My Tho Port				2.7	1.5	4.2
(I-1-13) Dong Thap Port				1.0	1.4	2.4
(I-1-14) Can Tho Port				2.1	0.0	2.1
(I-1-15) My Thoi Port				0.8	0.5	1.3
I-2) Coastal Shipping Specialized Ports				26.4	35.0	61.4
I-3) Port Management Improvement				neg.	neg.	neg.
I-4) Sea-cum-Riverways Development						
(I-4-1) Lach Giang - Hanoi - Viet Tri				1.9	2.6	4.5
(I-4-2) Cua Day - Ninh Binh + Quan Lien Canal				1.4	7.3	8.7
(I-4-3) Cua Dinh An - Can Tho - Cho Moi + Cua Tien - My Tho - Cho Moi				9.8	3.0	12.8
I-5) Sea-cum-Riverways Management				neg.	neg.	neg.

(2/2)

PROPOSED PROGRAMS AND PROJECTS	IMPLEMENTATION SCHEDULE			COST ESTIMATION (US\$M.)		
	1997-2000	2001-2005	2006-2010	1997-2000	2001-2010	TOTAL
COASTAL SHIPPING MANAGEMENT MODERNIZATION PROGRAM				neg.	neg.	neg.
M-1) Shipping Operators' Management Improvement				neg.	neg.	neg.
M-2) Introduction of New Services				neg.	neg.	neg.
M-3) Specialized Vessel Operation				neg.	neg.	neg.
M-4) Fostering Small Operators				neg.	neg.	neg.
SECONDARY TRANSPORT IMPROVEMENT PROGRAM				u.k.	u.k.	u.k.
T-1) Improvement of Inland Waterway Transport				u.k.	u.k.	u.k.
T-2) Availability of Secondary Transport at Coastal Shipping Ports				u.k.	u.k.	u.k.
T-3) Development of Ancillary Service Industries				u.k.	u.k.	u.k.
MARITIME HUMAN RESOURCES DEVELOPMENT PROGRAM				4.5	20.9	25.4
H-1) Improvement of VIMARU and MITS				4.5	18.2	22.7
H-2) Training of Seafarers for Tanker Operation				0.0	2.7	2.7
H-3) Training of Landsmen of Shipping Companies				neg.	neg.	neg.
H-4) Training of Port-Related Personnel				neg.	neg.	neg.
H-5) Training of Maritime Safety Personnel				neg.	neg.	neg.
H-6) Training of Shipbuilding Engineers				neg.	neg.	neg.
H-7) Training of Ship Inspectors				neg.	neg.	neg.
MARITIME SAFETY ENHANCEMENT AND ENVIRONMENT PROTECTION PROGRAM				123.1	260.6	383.7
M-1) Amendment of Regulatory Framework for Ship Inspection				neg.	0.0	neg.
M-2) Technical Improvement by Testing Laboratories				1.3	0.0	1.3
M-3) Development of Visual ATN				40.4	34.9	75.3
M-4) Development of Electronic ATN				0.5	83.1	83.6
M-5) ATN Supportive Facility and Equipment				2.9	11.1	14.0
M-6) Improvement of SAR Coordination				neg.	0.0	neg.
M-7) Deployment of SAR Fleet				41.2	127.9	169.1
M-8) Improvement of Sea Communication by GMDSS				36.8	3.6	40.4
M-9) Establishment of National Oil Spill				u.k.	u.k.	u.k.
M-10) Preparation of Maritime Accidents Statistics				neg.	0.0	neg.
TOTAL				574.8	1180.5	1755.6

(a) Fleet Expansion and Modernization

Based on the projected demand pattern, the most critical coastal shipping route to develop, where the advantages of coastal shipping can best be realized in the short term (and where the highest economic returns will be achieved), is the north-south corridor. This connects the two major economic activity centers of the country via a number of intermediate secondary centers (involving a total of eight major ports). According to the Master Plan forecasts, traffic between all ports will increase from 2.4 million tons in 1995 to 3.8 million tons in 2000 (except for traffic carried by oil tankers and bulk cement carriers). This represents an increase of 58%. Traffic between the eight major ports will constitute 48% of all such general cargo traffic in 2000. Expansion of coastal shipping services, in terms of both quantity and quality, is therefore particularly urgent in this corridor.

It follows that providing the capacity for this growth in demand and improving the maintenance capability of the fleet are vital short term requirements. High priority should therefore be given to procurement support and improvement of ship repair yards in order to meet the sharply rising demand for coastal shipping up to 2000. Three shipyards have been identified which could increase repair services at low capital cost.

Larger and better ship designs are required, often for new types of services. However financial constraints mean that most of the acquired vessels will be purchased second-hand. There is little scope in the short term for supplying new vessels and there are many potential suppliers in other countries, so improvement of ship construction yards for the introduction of a standardized vessel is a low priority in the short term.

(b) Ports and Waterways

Increasing capacity of ports is another important link in the implementation of the Master Plan, especially at the eight priority ports in the north-south corridor. The ports of Haiphong, Danang and Saigon are given particular priority in the short term because of their extensive range of benefits covering many users. Coastal shipping traffic through the main eight ports is projected to rise from 1.9 million tons in 1995 to 3.2 million tons in 2000, an increase of 68% (which is faster than the increase of 58% in general cargo traffic as a whole). Since these ports are expected in 2000 to handle 86% of coastal traffic (excluding oil tanker and bulk cement carrier traffic) for either loading or unloading (and often both), they play a particularly important role.

To connect the priority ports to the main north-south corridor the sea-cum-riverways have to be improved, both through dredging and other physical works, and through the supply of navigational aids. These measures represent another essential link in the short term implementation of the Master Plan. By contrast, development of other sea-cum-riverways which do not serve the priority ports are of lower priority and can be developed after 2000. The opening up of the network to serve Hanoi merits particular priority because this links the two main cities of the country.

(c) Management Modernization and Human Resources Development

Modernization of shipping management and development of human resources both deserve high priority in both short and long terms because of the crucial lack of skilled personnel in the maritime transport industry. Lack of resources means that providing the required number of qualified and experienced staff will take many years. An early start at training staff at all levels is crucial, and should be directed at developing the shipping fleet and services in the north-south corridor, including new types of services, such as liner services, which are expected to be introduced before 2000. The investment priority is to improve training equipment at VIMARU and MTTTS. This is where most training activity is concentrated and allows most cost effective use of scarce training resources.

Policy measures to encourage the introduction of new services and new operators (especially small operators that play such an important role in stimulating competition and efficiency in the industry, largely dominated by a large inefficient, state-owned monopoly) also deserve high priority. They involve little investment on the part of government but can achieve enormous potential benefits.

(d) Secondary Transport

Although development of secondary transport services to and from coastal shipping ports is another important link in the Master Plan, there is generally expected to be adequate capacity in the short term because of possible river and road improvement projects. However policy action is required in the short term to encourage the development of freight forwarders.

(e) Maritime Safety and Environment Protection

To strengthen safety and environmental standards, priority should be given in the short term to improving the regulatory framework, ship inspection equipment and procedures, and the SAR coordination framework. All these involve relatively little investment and tackle the safety problem at its roots, by trying to reduce the risk and severity of accidents. Better accident statistics are also required to develop a comprehensive safety improvement program.

Improving ATN and SAR, especially in the busiest waterways near priority ports, benefit a wide range of people - not only in coastal shipping but also in international shipping and fishing. Furthermore, Vietnam is committed under international treaties to raise standards of maritime communication and ship inspection standards. Therefore they could be regarded as short term priority projects for coastal shipping. However because of the high costs involved and constraints on government spending, much possible short term expenditure may have to be deferred by government.